CANADIANARCHITECT

ABOVE A PHOTO OF THE FACILITY'S EXTERIOR ILLUSTRATES THE ENORMOUS CONCRETE BUTTRESSES REQUIRED TO BRACE THE 110-METRE-LONG GLULAM BEAMS.

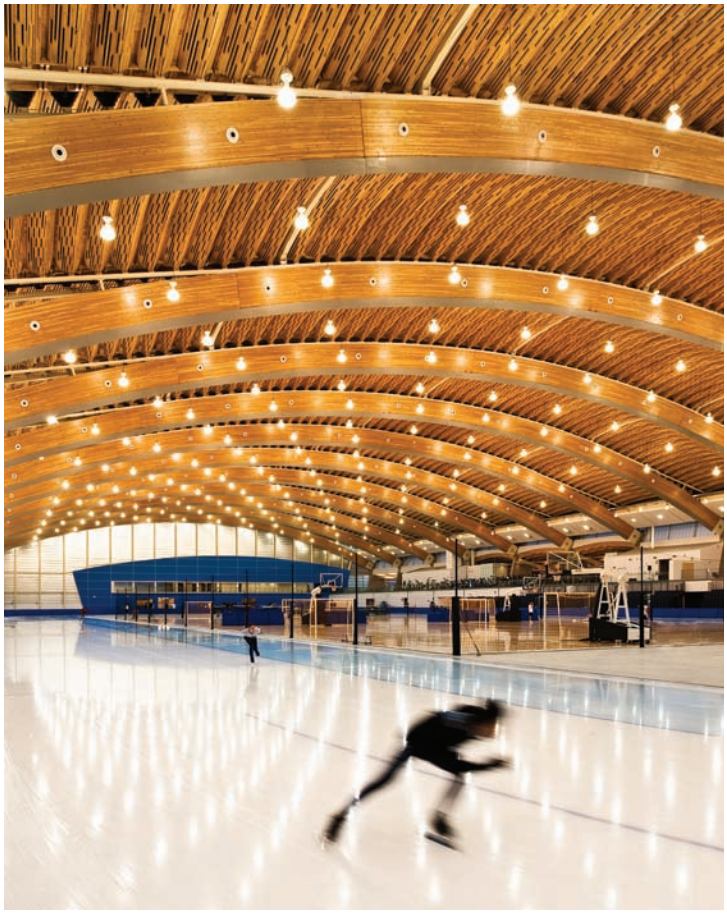
RAIC AWARDS - INNOVATION IN ARCHITECTURE (SCIENCE)

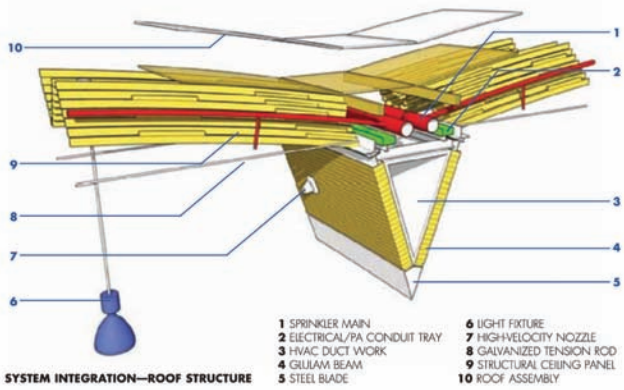
RICHMOND OLYMPIC OVAL

The City of Richmond Speed Skating Oval is a vast 506,000-square-foot structure designed as a dual-use building, housing not only the speed skating venue for the 2010 Olympic Games, but also, after the Games, becoming a permanent legacy facility functioning as an International Centre of Excellence for Sports and Wellness. Several design features include: the innovative use of one million board feet of discarded pine-beetle-killed wood in the creation of a stunningly beautiful structural ceiling; the innovative design of heating, ventilating, air-conditioning, plumbing, acoustical, electrical and lighting systems, all integrated seamlessly into the structural systems; and the innovative design in the way in which the building's dual function has been incorporated to provide the flexibility, adaptability and conversion features required from a single-purpose venue to a multi-use International Centre of Excellence for Sports and Wellness.

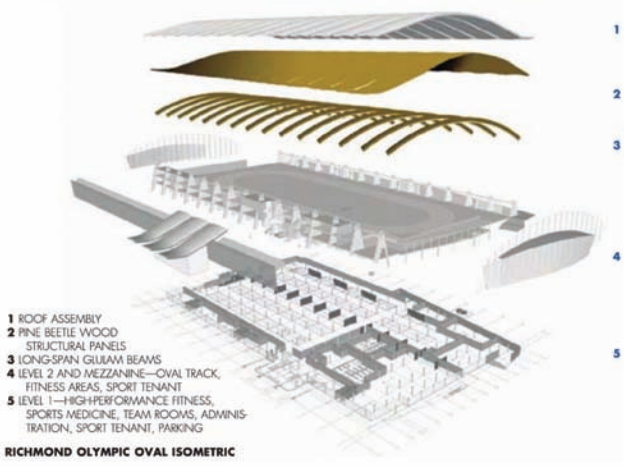
The Oval's main structure is comprised of 15 composite wood glulam arches or beams, spanning an unprecedented 100 metres in length. Local BC Douglas Fir lumber is used here, formed into a V-shaped composite arch to span the 100 metres, carried on 30 concrete buttresses. This design not only allows for an increase in the lateral stiffness of the arches but also provides interior space for air distribution and services. Additional innovation in arch fabrication was necessary as the geometry of the glulam beams and their stability relies greatly on the composite steel "skate-blade" beam that provides the base anchor for the wood material. This meant that the wood arches needed to be imported to a steel-fabrication facility and integrated into composite sectional beams to be assembled on site.

The Oval's ceiling and the secondary structural panels spanning 15 metres between the glulam beams are composed of locally harvested, pine-beetle-killed wood, in the form of standard 2"x4" lumber, simply nailed together to form a V-shaped wood box, arched to create the vaulted ceiling panels forming the "wood wave." Pine forests in BC have been devastated by the pine-beetle epidemic. By using discarded pine-beetle-killed wood for the entire 100 metre x 200 metre area of the ceiling





SYSTEM INTEGRATION—ROOF STRUCTURE



RICHMOND OLYMPIC OVAL ISOMETRIC

ARCHITECT CANNON DESIGN
LOCATION RICHMOND, BRITISH COLUMBIA

structure of the Oval, with one million board feet of lumber, the design team has produced, with the use of ordinary domestic lumber, a unique and distinctively beautiful surface.

The 20,000-square-metre ceiling of the Oval has all the heating, air conditioning, plumbing, acoustical, electrical and lighting systems fully integrated into the structural system of the glulam arch and the "wood wave" pine-beetle ceiling. HVAC ducts are integrated within the glulam beams with motorized nozzle jets placed along the length of the arch that deliver conditioned air to wherever it is needed and to provide environmental separation between the rinks and dry-land sport functions below. Electrical and other conduits are concealed within the pine-beetle structural ceiling panels. The desired acoustical properties are attained through the use of soft lumber, the perforations within the boxed pine-beetle wood beam, interior acoustical blankets and the V-shaped profile of the wood wave ceiling panels themselves.

Flexibility and adaptability within the multi-use legacy mode to allow for combined sports, recreation and community issues, all function at the same time as well as allowing conversions of each of these venues. For example, one most likely and popular conversion option is: 1/3 of the oval used for track & field programs, another 1/3 of the oval used for floor sports such as basketball courts, volleyball courts, etc., and the remaining 1/3 of the oval used for two international-sized ice rinks. The indoor speed skating facility is a relatively new building type, and the first purpose-built oval was built for the Calgary Olympic Games in 1988. Before that, all long-track speed skating events occurred indoors. All indoor speed skating facilities built to date have been single-use sport-only building which gives rise to significant revenue and operational challenges in the life of the facility since speed skating is a seasonal sport limited in use to athletes. The design of this Oval takes the evolution of this building type to a new level by not only meeting the high-performance sport requirements of long-track speed skating, but by enabling the facility to be convertible to several other sport and non-sport uses as well as for civic and community functions. The main activity space will allow ice sport to coexist with other sports or assembly uses at the same time. As well, the facility is designed to revert to the 400-metre-long track speed skating oval at any point in the future.

The cost implications of using wood as a major ceiling material as well as for the main and secondary structural members are more often than not prohibitively expensive. By using the locally harvested lumber form the dead pine forest, the cost savings – due to the innovative structural design and assembly of the lumber – was substantial, which allowed the design team to achieve the desired effect affordably.

Jury Comments

The innovative use of the discarded pine-beetle-killed wood integrates the spanning system with the mechanical system and creates an elegant roof. Here, glulam construction has evolved into elegant sculptural arches that integrate all HVAC, electrical and plumbing systems. The project demonstrates that a large-span structure can also manage to feel intimate, and allows for an effective amount of perimeter daylighting for the interior functions.